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## Designing for navigation and wayfinding in 3D virtual learning spaces

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## Designing for navigation and wayfinding in 3D virtual learning spaces

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Doctor Zeritonga and Shailey Garfield (in Second Life)



### What are the usability problems with 3D virtual learning spaces?

The research was not concerned with the design of the Second Life user interface

- Two related problems were identified: difficulties in navigation and wayfinding
- Why do these problems exist?
- How do these problems impact on educators and students?

## Why are navigational aids important?



- Imagine visiting a city in a foreign country or an island in Second Life for the first time. How would you find your way around?
- Signage is one form of navigational aid, but it is not necessarily the solution
- Signs might be too small, people might not understand them, or they may be poorly located
- Even without these problems, signs aren't the solution to wayfinding
- Wayfinding is about using other visual clues such as colour coding and feedback

## How did we address the usability problems?



By identifying and integrating navigation mechanisms from different environments:

- Mechanisms for real-world navigation
- Mechanisms for navigation in virtual environments
  - 2D virtual environments (the Web)
  - 3D virtual environments (computer games and Second Life)

**Research question:** In the design of 3D learning spaces to facilitate navigation and wayfinding, can the principles of game usability and Web usability complement the mechanisms of real-world navigation?

## Which navigational aids are applicable to Second Life?



- Real-world navigation aids such as architectural landmarks, maps, paths and signs
- Navigational aids from 2D virtual environments such as the home page of a web site and hyperlinks
- Navigational aids from 3D virtual environments
  - audio/video tutorials, HUDs and camera controls from computer gaming
  - notecards, teleportation and an avatar's capability to fly in Second Life

## Evaluating the effectiveness of navigational aids and peoples' wayfinding strategies



- Evaluate the usability of 3D learning spaces with the stakeholders (designers, educators and students)
- A combination of research techniques was used: expert evaluations and studies involving human participants
  - Heuristic evaluations
  - User observations with think-aloud protocols and post-activity discussions
  - Interviews with designers of 3D learning spaces, educators and an ISTE group tour guide



## Ethical considerations



- Recruiting participants
- The consent process
  - project summary sheet
  - consent form
  - include contact details of supervisor, project leader (including real-world information)
- Data collection and storage
- Retaining anonymity
- Approval of the research by the University's ethics committee
- Second Life snapshots

## Data analysis



Thematic analysis was conducted on the:

- Transcriptions of
  - The user observations and post-activity discussions
  - The designer interviews
  - The educator interviews
  - The ISTE tour guide interview
- Heuristic evaluation data

## Research findings: Effect on student's ability to perform learning activities



- Students may become frustrated or confused
- Students may make incorrect assumptions or may guess
- Students may aimlessly wander looking for their destination
- Learning activities will take longer than necessary
- Students may abandon learning activities
- Students may return to the entry point to find help

## Research findings: The user experience is affected by the lack of navigational aids



Participant quotes:

*"We have a library here on campus here at Walton Hall so I was looking for something that looked like that"*

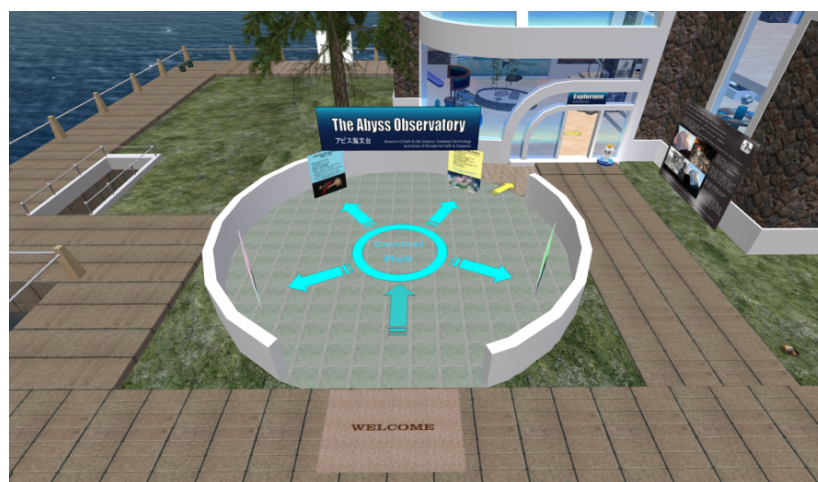
*"It looks nothing like a library. I would have never had guessed"*

## Research findings: Entry point design



- The design of the entry point is a crucial aspect of 3D learning space design
- It is important to make a good first impression on the user
- Design to orientate the user at the entry point e.g. Consider
  - having a 3D interactive model of the island
  - having an introductory tour
  - having an introductory video about the island
- The entry point serves as a place where users can return to for help
- The principles for the design of entry points for the Web can be applied to the entry points of 3D spaces

## The re-designed entry point of The Abyss Observatory



## Consistency and grouping



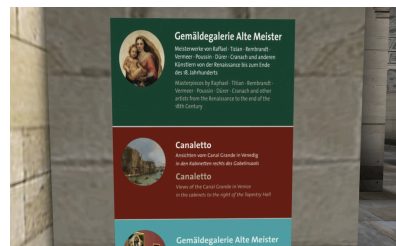
inconsistent design of the teleporters



inconsistency in the colours of teleporters and directional signs



items are not grouped in categories



a good practice example of grouping by colour

## Research findings: Design aspects that aid navigation and wayfinding



- Audio or visual feedback to user's actions should be easy to notice and appropriate to match with the context
- Colour and formatting is important in the design of objects
- Objects that are similar to real-world objects are easy to recognise
- Key locations should be easy to find or access
- Pathways and entrances should be easy to understand
- Signs and symbols to aid navigation should be easy to understand
- Well-structured islands make it easier to find one's way around

## Identification signs and directional signs



the entrance to the deep|think library



identification sign for the student room



lack of directional signs at an intersection



directional signs at an intersection

## Research findings: Wayfinding strategies



- The most popular method of moving around in Second Life is teleportation
- The level of Second Life experience can influence a user's wayfinding strategy
- If users cannot easily find their way around, they resort to the use of camera controls, flying or walking
- Therefore, provide a range of mechanisms to support navigation
- Design 3D learning spaces in an iterative process involving evaluations with users and re-design



## Orienting the user, path design



tour for orientation



notecard with descriptions of the functional areas



a teleport board



transition points in the paths

## Positioning of the maps



the map is obscured by the plant

the teleport map is positioned close to the entry point and is easy to notice



## Visual prominence of objects

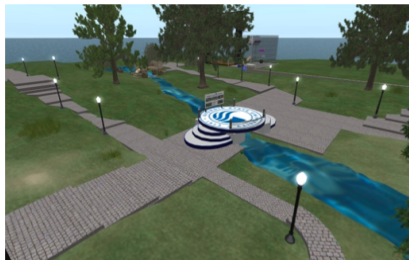


current position and possible locations are obvious and clear

the button to call the elevator blends in the background



## Easy to follow paths



easy to follow paths to key locations in the island

the path ends abruptly before the final destination in one of the sub-tours of the Marine Science museum



## Can the user identify their destination?



location is clearly identified by signage

there is no sign that this is the Abbey; further the design does not look like a real-world Abbey



## Can the user return to pre-set locations?



teleport maps indicating the entry point or landing areas in key locations

there is no easy way to return to the entry point other than by walking or by flying to look for it





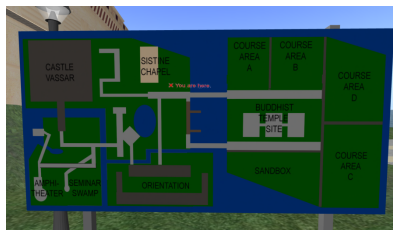
## Examples of good practice



directional signs at intersections



clear teleport instructions



labels embedded within maps and a 'You are here' to help orient the user



path legibility

## Outcomes of the research: Enhancing the designer's toolbox



- A set of heuristics for the design of 3D learning spaces or other islands in Second Life
- Many of the heuristics are specific to navigation and wayfinding
- Many of the heuristics are applicable to any island in Second Life
- Design guidelines for 3D learning spaces
- Exemplars for best practice guidelines for navigational aids



## Future research

- Quantitative data analysis e.g. studying how task performance is affected by implementing design changes
- Developing usability metrics to studying wayfinding performance
- Evaluating wayfinding strategies in real-world simulations of architectural structures